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CARNIVOROUS PLANT NEWSLETTER

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CARNIVOROUS PLANT NEWSLETTER

Volume 9, Number 3
September, 1980

Cover

Part of the completed CP exhibit of the British CP Society at the 1980 Royal Horticultural Society's Chelsea Flower Show. A fine stand of various species and hybrids of *Sarracenia,* some of which are in full bloom, as well as a very large clump of *Drosera binata* are quite evident. For more information and more photos, please see article beginning on page 69. Photo supplied by David Taylor.

The co-editors of CPN would like everyone to pay particular attention to the following policies regarding your subscription to CPN:

All correspondence regarding subscriptions, address changes and missing issues should be sent to Mrs. Kathy Fine, c/o The Fullerton Arboretum, California State University, Fullerton, CA 92634. DO NOT SEND TO THE CO-EDITORS. Checks for subscriptions and reprints should be made payable to CSUF FOUNDATION-ARBORETUM.

All material for publication, comments and general correspondence about your plants, field trips or special noteworthy events relating to CP should be directed to one of the co-editors. We are interested in all news related to carnivorous plants and rely on the membership to supply us with this information so that we can share it with others.

Views expressed in this publication are those of the authors, not necessarily the editorial staff.

Copy deadline for the December issue is November 1, 1980.

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Editor's Corner

The last part of this year marks a transition period for CPN. The formal by-laws for the International Carnivorous Plant Society are now being drawn up and we hope to present them to our readers in the December issue. Several changes are now being planned for which details are not available, but which will be announced in the next issue.

This issue is being devoted to *Dionaea* and will also highlight the British CP Society's participation in the Chelsea Flower Show. This show is world famous for its depth in presentation of plant material and the diversity of material presented.

The genus *Byblis* and *Cephalotus follicularis* are, as of 28 June 1979, considered to be threatened and therefore fall under the regulations of the Convention in International Trade in Endangered Species of Wild Fauna and Flora. Persons wishing to import these items into the United States not only must obtain a United States Department of Agriculture *import* permit, but also an *export* permit from the country of orgin which must accompany the shipment. Since both of these plants are Australian, the address for the managing authority is; The Bureau of Customs; Department of Business and Consumer Affairs; CANBERRA, ACT 2600; Australia.

The only CP that is listed as Endangered is *Sarracenia oreophila* as mentioned in the last issue of CPN. Persons outside of the US who wish to import this plant into their country would have to contact their managing authority to obtain a permit to *import* as well as an *export* permit from the US Fish and Wildlife Service plus any plant quarentine documents required by the importing country.

Persons wishing further information should contact Mr. Richard Parsons, Chief, Wildlife Permit Office; U.S. Fish and Wildlife Service; U.S. Department of the Interior; 1717 H. Street, NW, Washington, DC 20240, USA. Telephone is Area code 202 - 634-1496.

DONORS TO THE CPN SEED BANK

From July 22, 1979 — July 9, 1980

[For those before this see CPN Vo. 8, #3]

55 Donors 1484 Packets

R. Fleming 141, S. Jackson 110, R. Gardener 82, J. Mazrimas 81, J. Miller 70, J. Turnbull 68, J. Steiger 60, S. Boddy 54, J. Haldi 53, P. Cotter 50, R. Goulder 49, I. Kocsis 49, W. Clemens 46, M. De Paz 45, D. Foulger 41, P. Dwyer 40, D. Burden 35, D. Speirs 29, D. Burdic 25, F. Howell 25, J.M. Williams 25, W. Mrazek 22, D. Taylor 22, S. Smith 21, P. Heiple 20, D. Karohl 20, S. Olejnik 17, D. Butler 15, B. Carroll 15, R. Ballentine 14, M. Levy 14, J. Graham 13, R. Riedl 13, B. Deeker 10, H. Dickler 10, R. Frenzer 10, R. Humble 10, Y. Katagiri 10, R. Spores 10, S. Clancy 7, T. Davis 7, R. Matthes 6, C. Nave 6, R. Sivertsen 6, C. Bramblett 5, T. Johnson 5, G. Santagadi 3, G. Dolson 2, D. Muramoto 2, M. Nathanson 2, N. Asato 1, M. Cheek 1, S. Ishisaki 1, R. Leslie 1, D. Varez 1.

Pat also adds that the Seed Bank is getting very low in just about everything. As of 9 July, he has sent out over 300 orders. Donors should remember that they are entitled to one free packet of seed for every ten donated.

CPN SEED LIST

July 9, 1980 $.50 a packet

Byblis liniflora (9), *Darlingtonia californica, Dionaea muscipula, Drosera arcturi, D. capensis, D. capensis (narrow), D. capillaris, D. capillaris* (long leaf) (10), *D. capillaris* mix, *D. erythrorhiza, D. filiformis filiformis, D. heterophylla* (10), *D. internedia, D. macrantha* (10), *D. natalensis* (7), *D. peltata, D. planchonii* (10), *D. ramellosa* (2), *D. rotundifolia* (15), *D. rotundifolia* (Oregon), *D. spathulata* (Kansai), *D. spath.* (Kanto), *D. sp.* mix (10), *Pinguicula vulgaris* (13), *Sarracenia flava, S. flava* (Gulf) (8), *S. flava* (Gulf yllw / hvy vein mix) (9), *S. leucophylla, S. minor* (6), *S. purpurea purpurea* (9), *S. purpurea venosa, S. rubra jonesii, S. alata x rubra* (3), *S. flava x oreo.* (7), *S. leuco. x flava* (1), *Sarracenia sp.* (don't know what it is) (9).

News and Views

SCOTT ANIOLOWSKI [229 Cottage St., Lockport, NY 14094] sends the following comment and suggestions: "The Carnivorous Plant Newsletter has been around for nine years now — each year getting better, covering most of the CPs in nearly every way possible. However, there have been two plants totaly overlooked. I am speaking of course about *Genlisea* and *Polypompholyx.* In the past nine years these plants have only been mentioned a few times in passing, there have been no articles soley on either of these fascinating little plants. I realize that they are very rare in cultivation but even the elusive *Heliamphora* have been fairly well covered. Surely out of all of the people who read CPN there are a few who are fortunate enough to be growing these plants. Surely there is someone out there who can provide an article or two on the cultivation or other aspects of *Polypompholyx* and *Genlisea.* Surely there are some who can provide pictures — perhaps even for the covers. Come on CPers how about it—do we get articles on these two fascinating plants?"

ROBERT J. BEASLEY [1610 Aspen Dr., Alamogordo, NM 88310] writes: Thank you for the information. Since watching carnivorous plants in a 9th grade science class I have held the usual interest in these wonders. It was not until many years after college that this interest went anywhere with the first fly trap purchased at a local department store in Rapid City, South Dakota. That was when I was stationed near Rapid City. Needing something to 'personnalize' the home and the excitment of that first plant were all I needed to start a new hobby. Soon whenever I was in a large town I would seek out carnivorous plants. I remember in Denver I went from N. 58th St. to S. 120th to a greenhouse which advertised carnivouous plants. All they had were fly traps and some dried out purple pitcher plants. All that traveling only to find out [during the next trip to Denver] that a greenhouse ½ a mile away had sundews, pitcher, flytraps, butterworts and at the last stop excellent Cobra lilies.

If those types of searches weren't enough when I had temporary duty at another location I would drive and check out every large town. Every town between Rapid City and Shreveport, LA must have heard "do you have Cobra lilies". The only ones found were small specimans in 2" pots that only lasted one month with no signs of new growth ever.

Upon arriving to my new duty station in Alamogordo NM I needed a new home for a *Nepenthes* that had been in a gallon jar since Rapid City. Interesting moving the plants and my tropical fish as it was the middle of

winter. Anyway I set up a terrarrium in my new office for the *Nepenthes* and included one of the cobra lilies plus some flytraps. I don't know how many times I had to explain what the plants were and am still getting the "man-eating plants" jokes. At this point I thought I might lose the *Nepenthes* [but didn't] and the only source was a one time shot at a tropical fish store in Denver. I just couldn't believe that I was the only person in the world who wanted these unusual plants. Therefore I sent out to references in a book purchased through Edmund Scientific and your newsletter was one reference. So far [it's still early] yours was the only reply I've gotten. Your supplying a catalog from WIP confirmed that these plants are available. The only trouble is that now I have to learn those scientific names. Being as these plants are not readily available and that I have never seen the Carnivorous Plant Newsletter on the newstand I can only assume that it is run on volunteer labor. Enclosed is the subscription and this wordy letter is most simply a thank you from a weary traveler who has maybe found out about mail order.

WILLIAM J. ETGES [Dept. of Biology, University of Rochester, Rochester, NY 14627] is engaged in doctoral research on *Wyeonia smithii,* the mosquito larva inhabitant of *Sarracenia purpurea*. He is searching for locations of *S. purpurea* anywhere in the species range. He will be collecting pitcher contents only and there will be no plant or habitat damage. Anyone wishing to share locations with him may contact him at the above address. All locations will be kept confidential.

RON FLEMING [P.O. Box 283, Grant, FL 32949] noted the article by D.C. Speirs in the March, 1980 CPN [p. 15] concerning names used for both animals and plants. Ron wishes to add *Rana utricularia,* a common frog inhabiting the forest and swamp surrounding WIP in Florida.

ASHISH HANSOTI [18, Navjivan Bldg, Dattareya Road, Bombay, 400054, India] sent a note expressing his appreciation of the color portfolio on *Sarracenia flava* variants [CPN 9:4 I-44]. He would like to see the series continued with other species and genera on at least an alternate issue basis. [Ed. Note: We plan at least a yearly series of such comparative material in cases where there is confusion or debate. In addition, CPN will also soon begin a 'species book' in some kind of format.] Mr. Hansoti would also like to see an annual member directory that would list major interests. [Ed. Note: Such a periodic directory will be considered by ICPS and is provided for in the by-laws.] Finally, Mr. Hansoti wonders if anyone could correspond with him on using some sort of CP compost that contains neither peat or sphagnum since the latter items are very scarce and expensive in India.

I am going to try to grow some carnivorous plants myself. For this I have written to various nurseries and have received the catalogue from Marston Exotics [England]. I plan to try the following: *Dionaea muscipula, Drosera binata, D. capensis, D. spatulata, D. pygmaea, D. dichrosepala, Sarracenia leucophylla,* and *S. flava* These species I have chosen with the help of Mr. Adrian Slack's book *Carnivorous Plants* as well as his personal advice. I would very much appreciate your opinion as to which species will grow in Bombay. Here the high temperatures are the major problem—not the humidity, as we live near the sea. The plants will be placed in saucers of water.

There are three Indian species of *Drosera*-*D. peltata, D. burmannii* and *D. indica.* I am trying to find their habitat and collect a few specimens. I have been told that they grow abundantly on the slopes of the western ghats, but only during the rainy season. I am also going to try and grow *Nepenthes khasiana,* which is native to Assam and available rather cheap. The other *Nepenthes* are not available in India and at Marston Exotics they are too costly for me (£7 each). If you know anybody who would like to exchange seed of *N. khasiana,* or cuttings, for other *Nepenthes*, please write to me at the above address.

PAUL HEIPLE [1710 Zinnia St. Golden, CO 80401] writes: I'd like to know if any

other CPN readers have noticed an increase in CP growth after beaver [*Castor canadensis*] activity. Last fall I returned to a bog in Delaware County, New York, near my childhood home. On previous visits to this bog I had observed *Sarracenia purpurea* and *Drosera rotundifolia* growing on the sphagnum mat that ringed the central pond. This time however, I found the water level about a meter higher than on previous visits, backed up by a well constructed beaver dam across the narrow outlet of the bog. The trees that had been encroaching on the bog were all dead, killed by the continuous flooding of their roots. I could not get out to the sphagnum mat to determine the condition of the CPs that one grew there, as it was 7 to 10 meters from the new shoreline.

This rise in water levels seemed to me, at the time, a disaster for the CPs growing there. I thought surely that most of the plants had drowned, leaving a greatly diminished population that might never recover. A visit to a lake in New Jersey the following week changed my mind.

The lake in New Jersey was enlarged by an artificial dam built about 30 years ago. Cabins line the shore of the lake and power boats continuously cross the surface. Upstream there is a shallow area where power boats can not go. The stumps of the trees killed by the higher water have been left in place. Today those stumps are small islands covered with sphagnum moss in which grows *Drosera rotundifolia*. The shallow water between the islands is so choked with *Utricularia vulgaris* and other aquatic plants that it was difficult to row a boat through them. The sphagnum islands converged into a mat further upstream, but I did not go into that area to see if any *Sarracenia* or other *Drosera* grew there. I might add that a beaver had moved into this favorable environment.

The raising of water levels seems to convert areas into CP havens by killing back vegetation encroaching on the bog. Perhaps increased beaver activity may create new bog areas for CPs in forested areas by clearing the land of trees and flooding the old forest floor with shallow standing water.

CLIFF OWENS, [717 SE 16th St., Ft. Lauderdale, FL 33316] writes: In the past I had not given much thought of how formidable a Venus flytrap could be, but, as the enclosed photograph will show my opinions about the plant have changed. The trap shown is about life size with a young lizard caught in it. In South Florida lizards are everywhere and are attracted to my plants because of the potential meal of insects. On several occasions I have watched these young lizards play a dangerous game of "snatch-the-bug" among

my flytraps. As you can see this time the hunter became the prey. About two weeks after I snapped this shot I found another small lizard in a trap which had closed and sealed. This little fellow was still alive and quite active in trying to escape. This time I robbed the plant of its meal.

D.C. SPEIRS [Box 6830, Stn D, Calgary, Alberta, Canada T2P 2E7] writes: My recent article "Pinguiculas gotta swim,...", on carnivorophytes which share names with animals, brought forth an interesting letter from Ron Fleming [World Insectivorous Box 303, Grant, Florida 32949]. In that corner of Florida are various *Utricularia* species, sharing quarters with the Southern

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Short Notes

Ed. Note: The following letter was received from Associate Professor A. J. McComb, head of the Dept. of Botany, University of Western Australia in response to a recent article in CPN *("Cannington Swamp, R.I.P.",* CPN *9:8).*

The short article by Mr. A. Lowrie on "Cannington Swamp R.I.P.," published in a recent CP Newsletter, aroused quite a lot of comment here. It was brought to our attention by Dr. Wycherley, Director of the Kings Park and Botanic Garden. We were also contacted by the Director of the Department of Fisheries and Wildlife, which is responsible for wildflower conservation. I understand the latter organization is concerned about the legal aspects of removing rare plants from private land. [The legislation on this has recently been revised.]

This Department in fact controls a Reserve set aside in Cannington Swamp to conserve a sample of the flora referred to by Mr. Lowrie.

Dr. Loneragan and I have written a short article about our Reserve which you may like to include in a future issue of the Newsletter, perhaps as a letter to the Editor, or a short paper, and this is enclosed.

I hope that article may be of some interest to your readers.

Cannington Swamp

By
A.J. McComb and W.A. Loneragan
Department of Botany
The University of Western Australia
NEDLANDS, Western Australia 6009

This article is prompted by the paper of Lowrie [1978] who suggests that Cannington Swamp is disappearing through the activities of real estate developers, and who clearly thinks that the best thing to do is to dig up at least the carnivorous plants and transplant them to a place where they will be admired!

Let us assure your readers that all is not yet lost. In 1948 the University of Western Australia purchased 85.5 acres [34 ha] of the "swamp"region for research and teaching by members of their Department of Botany. Known officially as the "Yule Brook Botany Reserve, Kenwick," but invariably referred to by botanists as "Cannington Swamp," it is listed in the Gazette of the Government of Western Australia [9th November 1979] because of its special nature; no development of any kind can take place there without the approval of The Metropolitan Regional Planning Authority, in addition to that of the Local Authority,

The area is fenced. Signs on the land point out that trespassing is prohibited, and that the block is used for research. No-one has been given permission to collect plants from the land, and so we presume the collections referred to by Mr. Lowrie were made on adjoining countryside after permisson had been obtained from the owners.

The area has a history of botanical interest and use. The late Mr. C.A. Gardener, formally Government Botanist, collected extensively in the area and frequently took visiting botanists to view the unusual plant species there. Visits have continued, and the area has gained something of an international reputation among botanists; for example, Lloyd [1942] refers to it in his

standard work on the carnivorous plants. We normally include it in the itineraries of visiting botanists—either individuals or those attending symposia in this part of the world.

The Reserve consists of two low, sandy ridges separated by swampy flats; the ridges are probably remnants of old sand dunes formed some 100,000—300,000 years ago. The vegetation is a complex mosaic of plant communities in which, according to Dr. N.H. Speck, changes in structure and species composition usually reflects small changes in ground level. The floristic importance and interest in the Reserve and its environs is further illustrated by the fact that the current species list contains 459 species, of which 20 are from the carnivorous group.

Since the Department acquired the land, the Reserve has provided material and data for numerous undergraduate student projects in various aspects of botany, and first year students are taken on excursions to the area. Currently it is used in several Honours, MSc and PhD projects involving, for example, investigations into the flowering times and periodicity of the ridge species, relationships between leaf characteristics and environment, pollination, water relations of selected species and changes in population structure of tuberous species.

Our main problems have been maintaining fences; localized weed invasion [especially *Gladiolus, Romulea* and *Watsonia*] particularly along the firebreaks; dumping of rubbish on the boundries; and occasional instances of trespassing and vandalism. The developments which have taken place on adjoining land will presumably alter the groundwater table in the Reserve to some extent, but at this stage we are not able to disentangle any such changes from those due, for example, to the unpredictable nature of our climate. We expect in the future to have to face the difficulties of more intensive management of a reserve in an urban area, but we do hope that for many years to come Cannington Swamp and its interesting flora will be available through the Botany Department for inspection by visiting botanists, and for use in teaching and research work at this University.

On the Names of the Venus's Fly Trap

By William J Dress
The L.H. Bailey Hortorium
Cornell University

The scientific name *Dionaea muscipula* and apparently also the common English name Venus's fly-trap were coined by the English amateur naturalist John Ellis, and were used by him in a letter he sent to the famous Swedish botanist, Carl Linnaeus, on September 23, 1768. This letter, translated into Latin [perhaps by Linnaeus], was published in the Nova Acta Regiae Societatis Scientiarum Upsaliensis, Vol. I, pp. 98-101, either in 1770 or 1773 [authorities differ]. In the published version of the letter, the names were set out thus: "Dionaea,*Muscipula.* Anglice [i.e., in English],*Venus's Flytrap"*

A few years earlier, when the plant was known only as a dried specimen, Daniel Solander, a botanist and friend of Ellis's, had suggested the name *Dione* for it, but Ellis told Linnaeus that he had thought *Dionaea* to be more correct, since he had given the name of Venus to it in the English name. The goddess Dione, according to one myth, was the mother of Venus [Aphrodite] by Jove [Zeus], but both the Greeks and the Romans gradually came to apply the name Dione more frequently to the daughter [Venus] than to the mother. The adjective "Dionaeus", originally meaning "of or belonging to Dione [the mother]", likewise came more commonly to mean "of or belonging to Venus". In using *Dionaea*—the feminine form of the word—as a generic name, Ellis apparently intended it to mean "daughter of Dione" [literally, "a female related or belonging to Dione"], therefore "Venus".

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HOW VENUS' FLYTRAPS CATCH SPIDERS AND ANTS

By Stephen E. Williams [1]

The Venus' flytrap is a plant which is often written about and seldom understood. The literature about the plant is almost as much of a paradox as the plant itself. Although *Dionaea muscipula*[2] was called "Fly Trap Sensitive" in the first letters reporting its existence, the Venus' flytrap catches few flies in its native habitat in the Carolinas. How the trap senses an insect and signals its cells to move has been known for over one hundred years. Yet this mechanism, based on easily reproducible experiments which have been performed in reputable scientific laboratories all over the world, is often treated as trifling speculation in popular and educational literature. The mechanism by which the trap closes is usually confidently stated to be driven by a turgor change. However, what little evidence there is indicates that it may be a very rapid growth response! Much is known about how *Dionaea* traps its prey. Unfortunately most of the information in the technical journals does not make it to the average college and high school biology textbooks, which typically devote two to three pages to attractive pictures of and misinformation about carnivorous plants.

Do flytraps trap flies? What "flytraps" trap in their native habitat has been the subject of at least three investigations. All three indicate that a wide range of animals is caught, the most common being ants [about 1/3], spiders [about 1/3], grasshoppers [about 1/10], and beetles [about 1/10]. About one to four percent of the animals tend to be flies and mosquitos. Subsequent investigations I have made at other times of the year tend to confirm this pattern as a general one. However, photos in books and educational films nearly always show the plants catching flies. Indeed the plants do catch flies in our college greenhouse so, perhaps the observation of cultivated *Dionaea* led to the plants' inappropriate name.

How do the prey animals get into the trap? Most prey animals must walk or hop into the trap since the majority of prey are incapable of flight. The bright red traps and statements in the scientific literature have led some authors to say that animals are lured in by the color, a scent, or a secretion from the small glands that ring the rim of the trap. This seems reasonable until the evidence upon which the statements are based is examined. I have never noticed a secretion on these glands or an odor from a trap which has not captured prey. If an attractant does exist it must be one that attracts such unrelated animals as spiders, grasshoppers and ants. What attracts carnivores, herbivores, and omnivores from different phyla? The very low rate of capture of insects in the field is also strong evidence against the hypothesis that there is an attractant [Table I]. Frank Lichtner and I observed 224 open traps for a period of 24 hrs. Of these 201

Table I. Prey capture by *Dionaea* observed during a 24 hr. period dominated by heavy rain and during a period with no rain in late June near Supply, NC.

	RAIN	NO RAIN
Total traps	224	224
Traps that could close	202	201
Captures	0	6
Closures without capture	15	4

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[1] Department of Biology, Lebanon Valley College, Annville, PA 17003.

[2] The scientific name *Dionaea muscipula* means 'mousetrap plant of Venus'. See the note by Dr. William Dress in this issue for more detail.

THE GREEN SWAMP AND ATLANTIC COAST TRIP

By Jim Miller
2319 Ninth Street
Green Bay, WI 54304

The Orlando Airport terminal building was almost deserted when I arrived early on the morning of April 27th. Outside the birds nesting in the eves and nearby trees were chirping noisily, signaling the coming of dawn while the airport gradually came awake and crowded with passengers scheduled for early morning departures. The sun was barely over the horizon when Bob Hanrahan picked me up and we were on our way on a three day whirlwind tour of east coast CP habitats including the Green Swamp.

Heading North on Interstate 95, it was not long before we began to spot the bright yellow flowers of *Sarracenia minor* along the roadside. By the time we reached the Georgia border north of Jacksonville, the plants were a common sight. Along some of the lesser traveled roads we discovered two of the local Pinguiculas. *P. caerulea* was found in the greatest numbers along with fewer specimens of *P. lutea*. Both were in flower and displaying a good number of ripe seed capsules. *Drosera capillaris* was also here in great numbers as was *Utricularia subulata*.

Just a little farther north we began to encounter *Sarracenia psittacina* along with *S. minor* and many hybrids between the two. Indeed the hybridization and backcrossings were so common that pure plants of either species were difficult to find in some locations. This is a particularly variable and occasionally very attractive hybrid displaying a wide range of forms and coloration. Only a few specimens of *S. psittacina* here showed the large well-developed hoods so common in the Gulf coast.

Our next stop was the Okefenokee Swamp area. Just outside the park boundaries we found several large specimens of *S. minor* with traps of perhaps 60cm as well as a number of *Utricularia* species including *U. subulata, fibrosa* and *cornuta*. All were in full flower. Within the park itself we discovered the gigantic "Okee" form of *Sarracenia minor* with pitchers of perhaps 90cm. These plants are found growing partly submerged in roadside streams, the roots deeply buried in floating mats of sphagnum moss. At this point the plant appears to be well-established and secure in this protected area. Would-be collectors should note that the park in well-policed and the areas so suitable for this plant also are popular with water moccasins and alligators. The diminuative butterwort, *Pinguicula pumila* was also discovered in the park.

Just a bit farther north we encountered our first specimens of *Sarracenia flava*, the large traps easily seen from the car growing in a low wet depression near a power substation. A few plants of *S. minor* [the smaller type] were found here, but the majority of specimens were the typical yellow-green / purple throat form of *S. flava*. Large, well-developed specimens of *Drosera capillaris* were common here as well as large numbers of *Pinguicula caerulea*. Indeed, the violet flowers of the latter species were seen almost constantly along the roadside ditches and depressions throughout our trip. [FIG. 1].

After spending the night in Charleston, South Carolina, we renewed our journey north until we reached the Francis Marion National Forest. Though a number of roadside locations previously found to support Sarracenias had been destroyed by the four-laning of highway 17, others a bit off the main road proved to be perfect habitats for these plants. The Nature Conservancy has purchased one of these locations, a large parcel of land supporting extensive colonies of *S. minor* and *S. flava*. Many of the latter species displayed the attractive reddish lids and light to moderate venation not seen in plants of this species growing in the Gulf coast. Another interesting find was a small colony of hybrids between this red-topped form of *S. flava* and

FIG. 1: *Sarracenia minor* growing along with *Pinguicula caerulea* along the roadside near Jacksonville, Fla.

FIG. 2: *Drosera brevifolia* in the field near Georgetown South Carolina.

FIG. 3: All that remains of the once extensive stand of *Sarracenia flava* just off highway 211 in the Green Swamp. Some yellow flowers of a few surviving plants may be seen in the distance.

FIG. 4: Some extensive colonies of *S. flava* about a mile off highway 211 in cleared areas.

S. minor. One of these plants was flowering and was pollinated to assure a new crop of seedlings for the next spring.

Near Georgetown, SC, we spotted the dark red flowers of *S. purpurea.* These plants were growing on an embankment beside the road in rather dry conditions but appeared to be healthy. *Drosera capillaris* was evident in great numbers but closer inspection of these plants revealed that a number of specimens were, in fact, *D. brevifolia.* These plants were much larger than those observed in other locations but identification seemed positive based on the glandular flower scapes and proportionately large white flowers. The largest specimens were probably 3.5 cm across with 7-8 cm scapes.

At last reaching the Green Swamp area in the early afternoon, we stopped and explored a roadside sphagnum bog along highway 130. An incredible number of thorny vines made movement difficult here. No steps could be taken without some article of clothing or even flesh snagging on the sharp thorns. Not far into this area we located large groups of *Sarracenia rubra* growing in coarse sphagnum and mud. *S. flava* was also in this bog but in smaller numbers. *Drosera intermedia* was seen for the first time on this trip in large numbers growing in the sphagnum and wetter spots.

Further exploration of this area revealed *Dionaea muscipula* in low wet areas where the soil is mostly sandy clay. The flytraps were rather plentiful and in the course of our explorations were revealed to grow in a variety of conditions from wet roadside ditches in full sun to pine savannahs and scrub often almost buried under pine needles, tall grasses, fallen leaves and other debris. In some spots *Dionaea* was almost as plentiful as *Drosera capillaris.*

One of the highlights of the trip was the discovery of one of the last remaining colonies of *Drosera filiformis* v. *filiformis* in the Carolinas. There were perhaps two or three dozen plants in this location along with some small seedlings growing in the damp soil above the high water line. No plants were found in the wettest spots in this location.

Both *Sarracenia purpurea* and *S. minor* were seen along the roadsides in small numbers. *Drosera intermedia* appeared to be the most common sundew in many locations, far surpassing *D. capillaris* in numbers in these spots.

But our enthusiasm was rather short-lived as we drove out highway 211 into the heart of the Green Swamp and found much of the land to be cleared for what appeared to be forestry. Huge, deep ditches had been cut through the area lowering the water table and drying up many habitats [FIG. 3] We were horrified at the sight of thousands of pitcher plants uprooted and scattered about the soil. It was my impression that this area was supposedly protected and indeed reread CPN [Vol. VI, No. 3, p. 48] Don Schnell wrote: "On 8 July, 1977, it was announced that the Federal Paper Board Co. would donate 13,850 acres of the Green Swamp to the Nature Conservancy for permanent preservation...The land will be treated as a natural area and recreational development will not occur. This very generous parcel includes many fine CP areas that have been little tampered with due to drainage problems the company encountered. Green Swamp trekkers will appreciate that such areas as the well-known, large spring-fed bog of Sarracenias along and east of NC 211 will now be preserved.

Since returning, I have discussed this with Don Schnell and he has assured me that the areas of devastation are not part of this parcel of land and that the protected areas have relatively little frontage on highway 211, many requiring a helicopter to view.

We followed some dirt roads deeper into the region and the sights were the same wherever we went. That thousands of Sarracenias have been able to survive the initial clearing is remarkable testimony to their strength and endurance but their ultimate survival in this area is certainly questionable. It was evident to both Bob and I that the extensive commercial exploitation of the swamp has not truly made much of a dent in the *Sarracenia* populations. The number of plants we saw were amazing. But this forestry project appears destined to spare nothing. [FIG. 4.]

(To be continued)

THE 1930 RHS CHELSEA FLOWER SHOW
MAY 1980

By David Taylor

The world famous Chelsea flower show held during the third week in May, attracts thousands of people from all over the world. It is one of the most spectacular horticultural events that any lover of plants can visit.

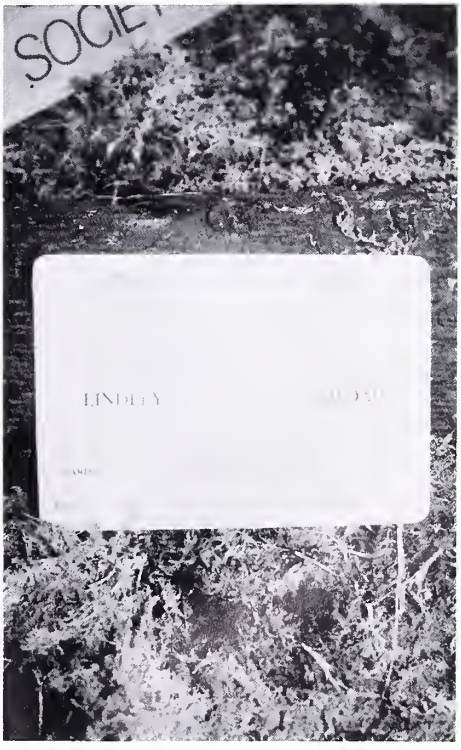
For the last two years, the Carnivorous Plant Society have exhibited a display of CP in the great marques at the show. Last year was a tremendous success for the society, and the exhibit drew the attention of many

Public reaction to CP exhibit at Chelsea Flower Show

Photos supplied by David Taylor.

people. This year was also very successful and the combined efforts of some of the society members created an attractive display. Once again the many fine plants attracted the general public and a rota of members were on hand every day to answer questions. Classic remarks from the public like "When is feeding time?" and "Can you find a fly so that we can see them work?" were common enough events during the show, and we had to exercise extreme patience when making attempts to answer some of the public's questions. It is so amusing to hear some of the remarks made by the public. I well remember the clever fellow who went to great pains to explain to his family and friends how the flower of the pitcher plant consumed flies into its petals.

Once again the society were awarded for their efforts by the Royal Horticultural Society, and a silver-gilt Lindley medal became yet another possession.



The Lindley Medal

For more information on the British CP Society, write to John Watkins, President, British CP Society; 98 Earls Court Road; London W8 6EG; England.

THE 1980 RHS CHELSEA FLOWER SHOW

PREPARARATION OF STAND BY MEMBERS OF BRITISH CP SOCIETY

Photos supplied by David Taylor

THE FINISHED STAND WHICH WON THE LINDLEY MEDAL

"C.P. GROWING the UNIQUE WAY"
"—REPORT from DOWNUNDER—"

by Peter Tsang
528 Mt. Crosby Rd.
Austead, 4070 Australia

The love of nature has been within me as far back as I can remember—beginning at the age of 5 or 6, I started off with collecting butterflies, dragonflies, bees and other insects. Then, when approaching teenage years, fish-keeping became a part of my life.

I can still remember very vividly how enchanted and spellbound I was at my first encounter with the sun dew—*Drosera spathulata* during a trip to the countryside collecting little fish for my aquarium. That was my most joyful trip, still as a preteen boy, coming home with my hand and knees covered with mud and a pocket full of glittering living jewels. However, my happiness was very short lived, because of lack of knowledge, all my beautiful sundews soon died. I tried several more times since then, but met with the same sad results. Soon, it was all forgotten.

By the time World War II was over, my interest in plants had grown from cacti and succulents to much wider fields. Upon my first visit to the glass house in our Hong Kong Botanic garden, I saw for the first time a *Nepenthes,* [it was *N. mirabilis* which is also a native to the Hong Kong larger islands]. Once again I was completely captivated by its strange but lovable appearance. The memories of my pocket full of sundews flashed back vividly again. Since then C.P.s have become one of the most treasured items in my collection of plants.

Since 1952, I extensively toured all over South East Asia for tropical fish and plant collections as well as photographic assignments. One of the most impressive sights I ever encountered was up on the highlands in the Philippines. Driving along the narrow mountain road, looking over on one side was a drop of thousands of feet while on the other side of the road was the mountain face completely covered with ferns and *NEPENTHES ALATA.* Here and there one would also see a dash of mauve—azaleas and a sparkle of brilliant yellow-orange—rhododendrons. This was indeed a paradise that catered to botanists and horticulturists of all diversities.

Now I still go out to collect fish whenever chance permits. Although *D. spathulata* is no longer a constant residence in my CP collection, I never fail to stop to admire them where ever & when ever they come in my path. The fascination & enchantment they bring me is just as strong & intense now as when I met them for the first time when I was a little boy 40 years or so ago.

Since I settled down here in Brisbane, tropical fish and aquatic plant cultivation have become my livelihood. Even though my *bush* house has a 50% shade cloth over it, my pools of fishes and plants in the *bush* house still receive too much light, particularly during the summer months; and the water turns green too quickly and would not clear up. Duck weed was used to provide extra shade but proved unsatisfactory because it grew too fast. Soon the entire pool was completely covered. Too much time was needed to thin them out at regular intervals. Another method was then used and proved to be most successful. Simply by floating pieces of coolite sheets [polyurethane] on the surface of the water did the trick. In the mean time my CP collection is growing; and since I grow my CPs in coolite [polyurethane] trays which are unsinkable, one by one they have replaced the coolite sheets that float on my pools. These CP trays provide shade and in turn, the pool provides moisture and seems very close to the natural bog enviroment! My *Nepenthes*, on the other hand, are all grown in clay pots hanging above the pools. The following pictures and captions to each picture will give a much better idea.

Picture 1: *S. leucophylla*

Picture 3: *Dionaea muscipula*

Pictures 1 & 2 show some of my *Sarracenia*. Top picture 1] being *S. leucophylla* and bottom pic. 2] being a hybrid—*S. alata* x *S. psittacina*. One of the two seed pods shown yielded 125 seeds. The other one being an off season flower produced no seed at all.

Pictures 3 & 4 show two of my several trays of Venus Fly Traps. Top pic. 3] is one of my new experimental potting mediums in which the V.F.T. are grown. Also a new type of moss was planted in that tray but it can hardly be seen because of the small size and amount. I am hoping to find a kind of moss that will form a very soft, low carpet covering the potting medium. Sphagnum moss is very nice but it grows too tall and fast so that it soon takes over and covers up all my V.F.T. Bottom pic. 4] shows exactly what I mean! Note that there is also a *Nepenthes* growing in there. This is how and where I stick my *N. kampotiana* during the summer months. That piece was stuck there for only about three weeks and was just starting to root.

Pic. 5 & 6: Pic. 5] shows my tray of *Pinguicula primuliflora* which I started off with only one plant two years ago. 24 months later they covered the entire tray. The inside measurement of the trays are 17" X 12". Pic. 6] shows some of my *Sarracenia* seedlings protected from heavy rains by glass.

Pictures 7 & 8 show some of my *Nepen-*

Picture 2: *S. alata x S. psittacina*

Picture 4: VFT. in sphagnum

Picture 5: *P. primuliflora*

Picture 7: *Nepenthes* Sps.

thes hanging over the pools.

Pictures 9 & 10: Pic. 9] shows my two trays of North Queensland *Drosera*. They are kept in the coolest and shadiest part of the *bush* house to meet their requirements. The tray on the bottom contains *D. prolifera;* and the on the right, with elevated glass cover, contains *D. schizandra* which is, as far as Queensland geological conditions are concerned, a high altitude plant. Perhaps the best way to grow *Drosera schizandra* successfully is to first understand their natural habitat. They are found growing along the sides of a creek in very heavily shaded area close by a waterfall by the name of Windon Fall somewhere on Mt. Bartle Frere. The mountain is over 5,200 ft [1,730m] high—the highest mountain in Queensland. With this high altitude [a midget in comparison to some mountains in other parts of the world], the plants grow in a very moist and heavily shaded area. They also have to be grown cool. I use a growing medium of 2 parts german peat and one part of Queensland peat, which is more of a leaf mold rather than peat, and contains a bit more nutrients in it. In fact, I use this mix for all my CPs except for *Nepenthes*. Here, I use I part fine grain charcoal, I part perlite, 2 parts crushed sphagnum moss and 2 parts of this peat moss mixture. I get excellent growth. I plant live sphagnum

Picture 6: *Sarracenia* seedlings

Picture 8. More *Nepenthes*

Picture 9: N. Qld. *Drosera*

Picture 11: *N. rajah* seedlings

moss around all CPs for three reasons: To stop the peat from splashing all over the place when watering, to create a better acidity and to look nice.

Under the above conditions, some of my *D. schizandra* grow 3½ inches [8.5cm] in diameter. When the plant is healthy, the tentacles have all the dewy drops on the leaves; and if not happy, the leaves are still green and firm but appear dry and the dew drops are absent.

To propagate them, just cut a leaf off and lay it completely flat on the surface of a peat moss medium. The whole leaf must be in direct contact with the wet peat or otherwise the leaf will dry out very quickly. The cut leaf will stay like this for a very long time until about 35 days later the edge of the leaf starts to deteriorate and that is the time it will begin to proliferate— exactly in the same fashion as *Drosera prolifera*. A large leaf of *D. schizandra* can produce 30 or more plantlets! You must give your *D. schizandra* very high humidity and shade and cool temperatures to be successful. Pic. 10] shows 3 of my *Nepenthes* seed germinating trays. The tray on far left had its coolite wall removed to show the shallow glass frame with partition set diagonally so that one tray can house two different species or hybrids.

Pictures 11, & 12: Pic. 11] shows a full tray

(continued next page lower left)

Picture 10: *Nepenthes* seed

Picture 12: *D. schizandra*

(continued from p. 65)
were observed to be capable of closing rapidly enough to capture an insect and yet only 6 traps did capture prey. If we assume that the four traps that were closed but did not capture prey were triggered by prey that got away, Then only 5% of the traps were triggered by prey during 24 hours of a warm summer day. At this rate a single trap might be triggered by prey an average of once every 20 days, and capture prey once every 40 days! If there is an attractant it is not a very effective one.

An insect or spider that enters a trap is likely to be just passing through or even resting in the trap. I have seen spiders resting in untriggered traps and ants and beetles passing through. All seemed as indifferent to the trap as they might be to any other twig or leaf. The one beetle I saw pass through tripped two hairs and was captured. The clumsy beetle, which was running when caught, is the only spontaneous capture in nature I know of that has been observed. I hope other readers will report their observations on plants in the field so that a more complete picture of prey capture can be obtained.

Do raindrops close traps? The observation was made by Darwin that "Drops of water, or a thin broken stream, falling from a height on the filaments, did not cause the blades to close". Anyone who has watered a bunch of *Dionaea* plants knows that in general this statement is true, although on occasion a trap will snap shut. Darwin concluded "No doubt as in the case of *Drosera*, the plant is indifferent to the heaviest shower of rain". This has been picked up by many authors and drops of water have been treated as having mystic properties that will not result in the closure of traps. However, any stimulus that bends a trigger hair far enough to cause it to send its signal and does this twice within a few seconds will cause the trap to close—heavy rain included. Frank Lichtner and I observed 224 traps during heavy rain. In table 1 it can be seen that the insects, unlike the botanists, had enough sense to stay out of the rain since none were captured. [We also observed very little insect activity as compared to the dry period.) Despite this, there were 15 closures without capture, which were presumably caused by raindrops. The rain was extremely heavy and lasted all night and much of the morning. It is likely that drops which push a trigger hair far enough to cause it to send a signal are rare and that two within a few seconds are a very unlikely event. Perhaps the lack of closure of *Dionaea* in response to a single stimulus to a trigger hair is an adaptation which helps prevent traps from being closed by rain but traps are not "indifferent to the heaviest shower of rain." About 7.5% of the traps were closed during the rainy day we observed.

How are traps triggered to close? However it gets into a trap an insect must trip trigger hairs to cause it to close. Unless it is very hot, the insect must trip one hair more than once or two hairs in succession within a few seconds or the trap will not move. It is at this point that on understanding of the physiology of the trap helps us understand how capture occurs.

As long ago as 1873 Burdon-Sanderson demonstrated that pushing a trigger hair results in an electrical signal called an action potential which spreads over the surface of the trap at a rate of 10 to 20 cm a second. Since that time Burdon-Sanderson's experiments have been repeated in numerous laboratories around the world so that there is no question of their accuracy [FIG. 1]. Burdon-Sanderson and his colleague, Page, also first clearly demonstrated that more than one electrical signal is needed to cause trap closure. Their 1876 paper [which is the

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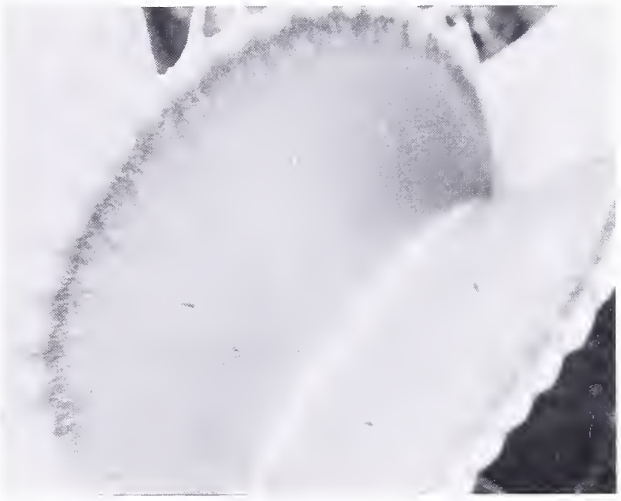
(Tsang 'CP Growing')

of *Nepenthes rajah* seedlings germinating extremely well. These seeds were planted on the 1st of Feb., 1979. The picture was taken in late March. By late April most of them had produced their first pair of true leaves. In early May I had them planted out into community pots—15 plants per pot. Now some of them are nearly an inch tall with their 4th leaves well on the way. [A picture to show the much more advanced development of these *N. rajah* will come a little later.]

Pic. 12] is a close up of *D. schizandra.*

Fig. 1. A method of recording the electrical signal or action potential from a *Dionaea* leaf. a[Cotton wicks soaked in 0.1M KCl solution are positioned on the leaf. These are connected by silver-silver chloride electrodes to a high impedance preamplifier which is in turn connected to a high speed chart recorder. One wick is placed on the surface of the leaf at the spot where the electrical event to be recorded will occur and the other wick, the reference, is placed on a site where we do not expect to see any changes; in this instance on the petiole of the leaf. The moving recorder chart shows how the difference in electric potential at these two spots changes with time. b] A recorder chart recorded from electrodes positioned like those above [negative is up]. The surface of the leaf suddenly becomes more negative after the trigger hair is stimulated, producing the "spike." Later the surface of the trap is more positive than it previously was during the "afterpotential." The photograph 'a' above is by Steven F. Vozzo, a student at Lebanon Valley College. The recording in 'b' is from Williams [1966] and is reproduced with the permission of the American Philosophical Society.



Close-up of trap of *Dionaea*. Trigger hairs are visible.
Photo by Steve Smith

best research ever done on *Dionaea* physiology] was somehow overlooked by Lloyd and thus tends to be ignored by those who depend on his book as a guide to the older literature.

When a trigger hair is pushed it will either be pushed far enough to trigger an electrical signal or it will not. If it is pushed far enough a signal will spread out over the surface of the trap, radiating from the trigger hair like a wave radiated from a stone cast in a pond. For a fraction of a second [the refractory period] a second signal cannot be initiated by pushing this same hair. After this period a second signal can be initiated. The electrical signals are produced in cells on the surface of the trap as they spread. Each cell also has a refractory period so it cannot produce a signal for a short time after the previous signal was produced. As a result of this, if two hairs are pushed at once each will produce a signal that radiates from its base but, unlike two waves on a pond which will cross each other, these waves stop where they meet since they cannot pass the cells which are in their refractory period. Thus when two hairs are stimulated simultaneously, each cell in the trap sees only one signal even though two hairs were pushed.

The cells that cause the movement are apparently the cells on the trap surface [epidermal cells] and the movement occurs out in the lobes, not at a "hinge" at the midrib as it is often stated. The response to a single signal is too small to be observed. Thus traps fail to move in response to a single stimulus [except at high temperatures] but they respond vigorously to two or more a few seconds apart. Somehow these cells sum the effects of the electrical signals they have generated. Each signal enhances the responsiveness to those that follow it so that the trap responds more vigorously to a series of signals than to just two. The influence of a particular signal on the response to a subsequent signal fades with time or decays and thus a signal given 20 seconds before a second stimulus will cause a far less vigorous response than one given two seconds before.

If an insect is to be captured or raindrops are to cause closure, two or more stimuli must be delivered to the trigger hairs at a frequency low enough to avoid the refractory period [they cannot be simultaneous or nearly simultaneous] but high enough so that the effect of one will not decay before the next signal occurs.

Each stimulus will result in an electrical signal even in a closed trap and the trap will respond to these by closing tighter and tighter. The more a prey animal struggles the more tightly the trap closes. The prey is not crushed by the lobes nor do any prey animals I have watched excrete anything as has been suggested by some authors. The prey is trapped in a pocket in the trap with

(please turn to p. 78)

ON THE NAMES...

(continued from p. 64)

Since Ellis coined the English epithet "fly-trap" for the plant, and since the Latin word for fly is "musca", one might assume that the Latin epithet *muscipula* meant "fly-trap". In actuality, *muscipula* means "mouse-trap", being derived from "mus" [mouse] and the verb "capere" [to capture]. If there were an analogous Latin word meaning "fly-trap", it probably would be spelled *muscicipula*. However, it seems unlikely that Ellis—and even more unlikely that Linnaeus—did not appreciate the true meaning of the word, and we must assume that they used it deliberately.

As it turned out, the publication of *Dionaea muscipula* in the Nova Acta turned out not to be the *first* publication of the name. Ellis had given Linnaeus the impression that he did not intend to have it published elsewhere, and so Linnaeus arranged to have it published in the Nova Acta. Shortly before it appeared in print there, however, Ellis published [1770] the name, with description and illustration, in a work of his own: "Directions for bringing over Seeds and Plants from the East Indies and other distant countries...To which is added the figure and botanical description of a new sensitive plant, called *Dionaea muscipula*..." This is a thin little book, only 44 pages long, and is quite rare; I have not seen it, myself.

CP ON TV

On May 19, 1980, Monday night, a TV program called **THAT'S INCREDIBLE** had a ten minute segment of CP. The film shots were probably from years ago. Henry Rehder [of *S.* x *rehderi*] was one who brought some plants and described how they worked. He is an old nurseryman from Wilmington, North Carolina who knows his plants, especially the *Sarracenia*. He was instrumental in exploring the Green Swamp area and guiding several researchers to many CP in the area. He made a good presentation of CP and we wish him many good years.

HOW VFT CATCH...

(continued from p. 77)

the trigger hairs where it is free to stimulate them and literally seal its doom. Continued stimulation of trigger hairs by an insect, nylon bristles or anything else for a number of hours will cause secretion of a fluid with an acid pH of about 2. This fluid kills the insect shortly after secretion begins.

At this point the stimulation of trigger hairs stops and the decomposition of the insect begins. Insect hemolymph [a fancy name for blood] leaks from the prey. This fluid is high in sodium ion [salt] and amino acids. Frank Lichtner and I have shown that traps are stimulated to close by these substances. Release of more amino acids and perhaps ammonium ion would occur once the prey's muscles begin to decompose. This chemical stimulation serves to keep the trap closed until digestion is complete.

Darwin tested a number of proteinaceous substance such as meat and egg white on *Dionaea* and claimed they stimulated closure. Most of the substances he tested would not have been salt free. Salt free egg albumin does not stimulate closure so it appears that salt in proteins and breakdown products from proteins such as ammonium ion and amino acids stimulate closure but that proteins themselves may be ineffective.

How the chemical stimuli act on the trap is not clear but a good guess would be that they are taken up by the digestive glands and cause the production of a plant hormone. Electrical signals are not produced once the insect stops struggling so the continued action on the trap must be due to stimulation by chemicals. When there are no more mechanical or chemical stimuli the trap reopens and awaits its next capture.

(to be continued)

COMING IN DECEMBER

—MORE *Dionea*

—GROWING CP UNDER LIGHTS

—CP GROWING IN CENTRAL FLORIDA

Review of Recent Literature

Curtis, Helena. Photographs by Oxford Scientific Films, Claude Nuridsany Marie Perennou, Inge Weilbrenner, Robert Noonan, E.S. Ross, Jeff Simon, Kjell B. Sandved, Jane Burton, Robert E. Pelham, Bruce Coleman, and A.J. Deane. Savage Plants. Geo Magazine, Vol. 2, No. 6, June 1980.

This article contains the best color photographs of CP that I have ever seen. There are 18 in all, some of which cover one or even two full size pages! Although the article only deals with the basics about these plants, and does not mention anything about their culture, I feel that it is well worth the price even without the excellent color photography. It is written in such a way that it makes the reader feel as though the plants are committing a serious murder, deceiving those poor helpless insects and even frogs [as illustrated]. It gives an excellent description of the happenings from when the insect first senses the nectar in the air to its final breath of air. [J. Gold]

Dennis, W.M., 1980. *Sarracenia oreophila* [Kearney] Wherry in the Blue Ridge Province of northeastern Georgia. Castanea 45:101-103.

S. oreophila is here reported for the first time from Towns County, Georgia, many miles east of the northeast Alabama epicenter. There is also a brief discussion of the history of the species outside of northeast Alabama, the nature of the Towns County habitat, and plant associates.

Fineran, B.A. and Lee, S.L., 1980. Organization of mature external glands on the trap and other organs of the bladderwort *Utricularia monanthos*. Protoplasma 103: 17-34.

The authors describe the location and morphology of external glands by ordinary and transmission electron microscopy. They support the concept that mature external glands are responsible for secreting water during the reset phase. [DES]

Harms, V.L. and Hudson, J.H., Heilman-Ternier, J., 1980. Contributions to the vascular flora of boreal Saskatchewan, Canada. Rhodora 82:239-280.

Drosera anglica, previously considered rare in the province, is reported in several more locations. *Sarracenia purpurea* is reported more north [mid-boreal] than previously locally abundant. There are also more more north [mid-boreal] than previously, locally abundant. The presence of *Pinguicula villosa* is a considerably southward extension of its previous known range in the province. *P. vulgaris* is sporadic but locally abundant. There are also more reports of *Utricularia minor* and *U. cornuta,* also previously felt to be rare but probably overlooked. Finally, *U. intermedia* and *U. vulgaris* are also mentioned but not unusual. These are the CP reported among many other plant species. [DES]

Johnson, Peter H. Photographs by Richard M. Adams II and David Thomas. House Plants and Porch Gardens Magazine, Vol. 5, No. 6, June 1980.

The author of this article gives a great deal of background about this Australian Pitcher Plant [*Cephalotus follicularis*] along with some excellent cultivating information. It is also accompanied by two color photographs. [J. Gold]

Johnson, P.H., 1980. Miniature carnivore. House Plants & Porch Gardens Magazine 5:34-36 [June].

This is a popular article on *Cephalotus follicularis,* including descriptive and cultural information, and two fine color photos by Rich Adams and David Thomas. There is one glaring factual error: *Cephalotus* is *not* the only pitcher plant in Australia since *Nepenthes mirabilis* is also found there. [DES]

Jung, K.D. and Luttge, U., 1980. Effects of fusicoccin and abscisic acid on sugar and ion transport from plant glands. Ann. Bot. 45:339-349.

Among the plant gland actions tested were the pitchers of *Nepenthes hookeriana,* where fusicoccin inhibited net excretion of chloride ion and abscissic acid stimulated excretion of potassium and chloride ions. Both had a similar effect on sugar secretions.

Kyle, Lawrence. Photographs by F Robert Wesley. The Rainbow Plant. House Plants & Porch Gardens Magazine, August 1979.

An interesting article is presented about the Rainbow Plant, *Byblis liniflora.* It is accompanied by three impressive color photographs of this plant. The information on culture is very brief, although an interesting background to the possible evolution of this plant is given. [J. Gold]

Love, A. [editor], 1980. Chromosome number reports LXVII: *Utricularia stellaris.* Taxon 29:361.

Utricularia stellaris is herein reported n=20. [DES]

Parrish, F.K. and Rykiel,Jr., E.J., 1979. Okefenokee Swamp origin: Review and reconsideration. J. Elisha Mitchell Sci. Soc. 95:17-31.

While this important paper mainly reconsiders the geologic origins of the Okefenokee Swamp, it has important ramifications for the geologic history of the entire southeastern coastal plain of the U.S. Previously considered to have been several hundred thousand years old and formed originally by sand bar impoundment of a sea water lake, the authors present convincing evidence that the swamp actually dates only from the last glaciations and is from 5-8,000 years old, and was formed from an expanding consolidation of peat deposits along slow moving streams as water tables rose with glacier melt, the area having previously been a xero-mesic oak-pine complex. The authors point out that other peat areas of the southeast [e.g. Great Dismal Swamp] have similar histories. Thus, the complex peat bog-swamp ecosystems developed over a comparatively short period of time, probably from propagules of founders washed down from peneplain bogs as the coastal plain became a more acceptable habitat. [DES]

Schwaegerle, K.E. and Schaal, B.A., 1979. Genetic variability and founder effect in the pitcher plant *Sarracenia purpurea* L. Evolution 33 [4]:1210-1218.

The study was stimulated by the unique, documented planting of a single plant of the species [source unknown] introduced to a large floating sphagnum island mat in the middle of a central Ohio lake in 1912. Since then, this single introduction has multiplied to thousands of plants, thus offering the opportunity to observe the founder effect with a very small bottleneck. Studies were done by allozyme electrophoresis on leaf extracts of these and plants from other locations, mostly northern [one location in North Carolina being only southern one]. The enzyme studies indicate a moderate degree of variablity in the species, with far less variablity among plants in the island population, although three other sites showed similar low degree of variablity suggesting founder effect there also. Variablity increased [as measured by this one parameter] farther east and south in the range. [DES]

Thomas, D. and Gouranton, J.,1979. Ultrastructural and autoradiographic study of the intranuclear inclusions of *Pinguicula lusitanica* L. Planta 145:89-93.

When observed electron microscopically, the intranuclear inclusions of *P. lusitanica* are seen to be lamellar, and enzyme digestion indicated they are protein. The inclusions grow in artificial media in which tissue slices are incubated.

Thorne, R.F., 1977. Some realignments in the *Angiospermae.* Plant Syst. Evol., Suppl. 1:299-319 [Springer-Verlag].

WANT ADS

Scott Aniolowski, 229 Cottage St., Lockport, NY 14094: [W] Any tuberous Droseras [plants], *Aldrovanda vesiculosa* [plants], any *Polypompholyx* [plants], *Byblis gigantea* [plants], any *Pinguiculas* [Plants], small, well rooted cuttings [with traps] of and *Heliamphora* and *Nepenthes*.

Francis Campbell Jr., 611 8th Ave., Menlo Park, CA 94025: [WB] *Cephalotus,* tuberous *Drosera, N. ampullaria, S. flava [different varients], S. oreophyla, P. planifolia,* other native US plants, *Heliamphora* sps. Plants / seeds of all.

Richard Chinnock, 3316 Old Kirkwood Dr., Virginia Beach, VA 23452. [WB] *S. oreophila, S. flava* [all but green and typical form] *S. x harperi, S. x excellens, S. ruba jonesii,* tuberous *Drosera*, Pygmy *Drosera, Pinguicula grandiflora, P. grandiflora* ssp. rosea, *Nepenthes bicalarata* [plant or seed], *N. ampullaria.* Plants,cuttings or seed of the following: *Utricularia menziesii, U. endresii, U. reniformis, Heliamphora* [any], *Cephalotus follicularis, Polypompholyx* seed.

Glenn Claudi-Magnussen, 22861 Quevedo Ln., Mission Viejo, CA 92691: [WTB] *S. purpurea x psittacina, S. minor x psittacina.*

Wayne Mrazek, 2270 Grayson, Anaheim, CA 92801: [WTB] *D. indica, D. trinervia,* Mexican *Pinguiculas* other than *P. macrophylla, Nepenthes,* any other than *N. alata.* [TS] *D. burkeana, D. hamiltonii, D. x nagamoto, D. abovata.*

Marie Santos, 53 S. Covert Ave. Elmont, NY 11003: [WB] Seed of, *Pinguicula gypsicola, Drosophyllum lusitancum, Drosera auriculata, D. cistiflora, D. drummondii, D. prolifera, D. glanduligera, D. indica* [red fl.] *D. stolonifera, D. sulphurea.*

Steve Smith, RD #1 Box 296, Kirkwood, NY 13795: [WBT] Any mexican *Pinguicula,* any tuberous *Drosera* [except *D. peltata* or *D. auriculata],* any *Heliamphora, N. villosa, N. edwardsiana, U. simulans.* Will buy or trade from my large collection [inquire for list].

Philip Thomas, Route 4, 144 Monticello Rd. Weaverville, NC 28787: [TS] Plants:*D. binata, U. dichotoma, D. bin. u. multifida, D. adelae, D. adelae* [Narrow-leaf var.], *P. caudata, P. primuliflora, Dionaea, U. sandersoni, U. tricolor, U. longifolia, U. prehensilis, U.* sp. [subulata complex], *U.* sp. [aquatic]. Seedlings, small plants: *S. purpurea, P. heterophylla, S. flava, S. ruba* ssp. *jonesii, S. oreophila x purpurea, S. oreophila x leucophylla.* Seeds: *Byblis liniflora.* All plants are *propagated* or artificial hybrids; *Cephalotus:* taking orders on tubes of meristemmed plantlets, $5.00 per tube of 8-12 plants.

Attention! CPN members: Let your collection support itself—sell those excess plants. We will buy or trade for any species. This is an effort to intensify the availability of the rarer species. Write to: Whispering Pines Nursery, POB 119, Bastrop, TX 78602 or call [512] 321-3061.

NOTICE

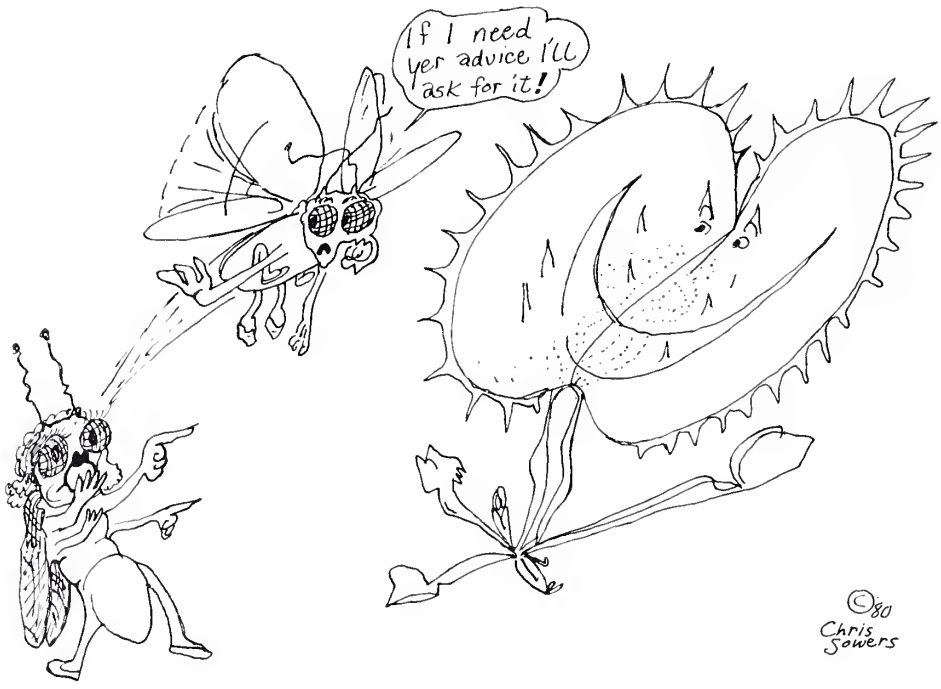
When submitting Want Ads, please be sure to print clearly for best results and to eliminate mistakes. Please circle the correct letter before each item (Want, Trade, Sell or Buy). Want Ads are limited to carnivorous plants, terrariums, greenhouses and moss. There is a charge of ten cents per item, with no limit to the number of items you may submit per issue.

Send coin or check to:

Arboretum, Want Ads
California State University
Fullerton, CA 92634

(**RECENT LITERATURE** cont.)

The author further clarifies his thoughts and endeavors into the highly subjective field of phylogenetics with a new classification that purports to be more practical, easier for students to use and comprehend, and in the author's opinion parallels likely decisions of the ICBN in future additions. Among CP, *Sarraceniaceae* and *Nepenthaceae* are mentioned, These being placed in their own suborders [*Sarraceniineae* and *Nepenthineae]* in the *Theales,* the *Sarraceniaceae* placement agreeing with DeBuhr. Relationships of the *Nepenthaceae* and *Dioncophyllaceae* are also discussed. [DES]



NEWS AND VIEWS

(continued from p. 62)

Leopard Frog, *Rana utricularia*!

My Latin dictionary says the word 'utricularius' means 'bag-piper'. Presumably the bladders of the plant are referred to by the generic name; as for the frog, anyone who has seen one croaking will immediately know what the specific epithet refers to.

On the even lighter side of carnivorophytes, the 6 March 1980 issue of New Scientist contained a spoof on how to produce better food plants. The proposal was to crossbreed rice with bladderwort. This would result in an aquatic grain plant which can catch its own food!

The subject of breeding *Utricularia* leads me to ask "Can the bladders be increased in size by selective breeding?" One can imagine something able to swallow adult fish, not just day-old fry.

ERRATA — Don Schnell reports that the following printer errors occurred in the *Sarracenia* portions of the June 1980 CPN [Vol. 9, No. 2]: The front cover photo is of heavily veined *S. flava [as in plant 4, p. 42]* and not of the Florida green lid / red tube variant. Also, the back cover is the copper-lid form of the Carolinas as in plant 3, p. 42, and again not the Florida form indicated. The captions for p. 42-43 are correct. In paragraph four of the text on p. 41, the heavily veined variant appeared on the cover instead of the Florida variant mentioned above. We regret the above errors and suggest you make penned in corrections on the back cover and the legend for the front cover which appears inside the front cover.

Frank Lichtner [left] and Steve Williams [right] collaborated on a study of the stimuli which control trap narrowing in *Dionaea* [Lichtner and Williams, Amer. J. Bot. 64:881-886, 1977]. This study also includes an analysis of the insects *Dionaea* captures in the field. Where they grow in North Carolina they are not "flytraps"; they are ant and spider traps! Frank did this work as student independent study project at Lebanon Valley College where Steve Williams is a professor. Frank has just completed his doctoral work at Cornell and is now an assistant professor at the University of California at Davis. Although his graduate research has been done on soybeans Frank has done some additional work on *Dionaea*. Steve Williams is continuing his research with the carnivorous plants at Lebanon Valley College where he has directed a number of students in research projects involving the physiology of carnivorous plants. He first began doing research on them in 1966 as the subject of his doctoral dissertation at Washington University and he continued his research at Cornell University where he did his post-doctoral work before going to Lebanon Valley. His major contribution to the understanding of carnivorous plants is his work, done with Barbara Pickard, which demonstrated that rapid *Drosera* tentacle movements are controlled by electrical signals, called action potentials, similar to those in *Dionaea* [and in animal nerves].

Drosera brevifolia in the field near Georgetown, South Carolina. Please see article beginning on page 66 for more details. Photo by Jim Miller